**Game Theory and Applications**
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**Abstract**

Game actions in the well-known murder game Cluedo involve interactions of different subgroups of players, that result in complex knowledge changes. We introduce a dynamic epistemic language to describe actions in Cluedo in formal detail. This provides us with a precise description of Cluedo strategies. Optimal strategies are not yet known.



**Abstract**

Voting indices may be symmetric and nonsymmetric. The Shapley-Shubik, Banzhaf and Deegan-Packel symmetric indices have corresponding nonsymmetric analogs. The nonsymmetric Banzaf index was proposed by Shenoy. We propose a modification of Banzhaf index without constructing a profile space. The index avoids problems that Shenoy's nonsymmetric Banzhaf index has and is derived directly from data. In the paper we explain problems of Shenoy's nonsymmetric Banzhaf index has. For the construction we may use two kinds of data, those are the number of seats of each party and Yea/Nay data of each party. Using these two data, we calculate the modified Banzhaf index of each party following proposed algorithm. As the numerical example the modified Banzhaf index of the parties of the House of Councilors in Japan both before and after the election in 1998 is calculated.



**Abstract**

The paper is concerned with a multicriteria game whose payoff takes its values in an ordered vector space. As compare with (usual) single-criterion games, we can not so easily draw image sets of the payoff. We consider bicriteria two-person zero-sum matrix game as a multicriteria game, in which each image set of the payoff function is a line-segment and touches an envelope. The aim of this paper is to classify payoff functions in the game by using envelope and to verify the results on personal computers.

**Abstract**

Epistemic logic is the logic of knowledge: how do you reason about the question whether your silent admirer knows that you know that (s)he sent you an anonymous Valentine card? Is it harmful if, at a literature-exam you dont know the contents of a chapter? No, as long as you know that the examiner does not know that you do not know it. Knowing whether your neighbor knows that he regularly plays his radio so loudly that you wake up during the night, may help you to solve the problem in an appropriate way. In negotiations, it will harm you to let the other party know your bottom-line, but it may be helpful to disclose other information about yourself, for example about some of your values. In this article, we will use examples and puzzles to give some flavor of the field and to demonstrate that the notion it is known that is meaningful and interesting for researchers in theoretical computer science, artificial intelligence and game theory. First, the logics for individual agents in a group are treated. In these, all agents may have different information and thus different epistemic alternatives at each world. Therefore, it is interesting to investigate how they reason about others knowledge. By adding knowledge operators to the language, a program is derived. This is followed by a short treatment of a logic used for authentication. Then, the semantics and axiomatization of different basic epistemic logics are introduced. The subject of different types of group knowledge such as common knowledge and distributed knowledge comes to the fore. A dynamic epistemic approach to the evolution of knowledge in games of imperfect information is given, based on the work of Van Ditmarsch.



**Abstract**

We consider here a two-person time-sequential game intended to model a competitive behaviors of two players who may have different aims. Suppose that the same players I (Labor union) and II (Management) jointly employ one secretary. We consider here a version of the arbitration problem of the following form. Let $\alpha_i$, $i = 1, 2, ..., n$ - is a sequence of random offers, interpreted here as the solution proposed by the arbitrator in period $i$. As the solution comes up, players I and II must decide whether to accept it or reject it expecting that a more favorable solution may come up in the near future. Player I (II) is interested to maximize (minimize) the expected payoff of the game.

Zero-sum arbitration games are considered where $\alpha_i$ are uniformly distributed in $[0, 1]$ random variables and $\alpha_i = (X_i, Y_i)$ is presented by double sequence of random offers for every players.

**Abstract**

A conception of the hierarchical control of sustainable development based on game-theoretic modeling is proposed. The principles of optimality of the hierarchical control of sustainable development as solution sets of the hierarchical game-theoretic models are formulated. The possibilities of leader's manipulation and follower's counter-game are also examined. A model example is considered.



**Abstract**

By means of an example of a superadditive 0-normalized game, we show that the maximum payoff to a dummy in the bargaining set may decrease when the marginal contribution of the dummy to the grand coalition becomes positive.



**Abstract**

Finite multistage game $G$ with simultaneous games $\Gamma(\cdot)$ played on each stage is considered. The definition of outcome, path in tree-graph and history are introduced. The new class of Nash Solutions based on the possibilities of punishment for the deviation on first stages of $G$ is defined. It is shown that the outcomes under these solutions dominate the classical subgame perfect Nash outcomes. Special case, finite repeated "Prisoner's Dilemma" game is considered. For prisoner's dilemma the regularization procedure is introduced.



**Abstract**

We model ethical behavior as a transformation from the vector that represents the advantage of a situation to each individual to a vector that represents the utility of that situation considering its advantage to others. When we consider ordinal utility we conclude that this transformation will not usually be surjective (onto.) We use this transformation to model a few well known ethical teachings.

**Abstract**

This paper presents the bargaining model in which the preferences of each player are expressed by the sequence of discount rates varying in time. It appears that Rubinstein's theorem concerning subgame perfect equilibrium in the model with constant discounts is not valid in the case of discount rates varying in time. An adequate counter-example is described here. There is a theorem of subgame perfect equilibria of a certain form in models incorporating sequences of discounts varying in time. The subgame perfect equilibria depend on solutions of a certain infinite system of equations. If the sequences of discount rates satisfy a certain condition, then there is only one subgame perfect equilibrium, in which offers of players are determined in the recurrent way and the offer of player 1 in period 0 depends on the sum of a certain convergent series. If this condition is not satisfied, then there are infinitely many subgame perfect equilibria. In the paper, some applications of the bargaining problem are also presented.



**Abstract**

This paper applies the Davis-Maschler type consistency axiom and its converse to assignment games and obtains axiomatic characterizations of the core and the SPB solution which is the intersection of the core and the kernel. The results will be extended to non-linear assignment games.



**Abstract**

The paper discusses a game model of simultaneous price setting- e.g.Bertrand competition- with a homogeneous good and firms heterogeneous in production capacities and costs. The interval of prices surviving the iterated elimination of weekly dominated strategies is computed. The paper shows that this interval is a global attractor for a wide class of adaptive dynamics including the best reply dynamics and the fictitious play. The sufficient condition of the convergence to the Walrasian price follows these results.

**Abstract**

In this paper, a new class of non-cooperative stochastic differential games in which there are overlapping generations of players facing uncertain payoffs is presented. The introduction of additional stochastic elements via randomly branching payoffs offers a fruitful alternative to modeling game situations under uncertainty. The development of differential game analysis in this direction is worthwhile and instigates the development of a paradigm of asynchronous horizons randomly furcating stochastic differential games. A characterization of the solution to a general class infinite-horizon overlapping generations furcating stochastic differential games is obtained. An application of the game in resource management is presented.



**Abstract**

In this paper, we describe how games are played by most people, not just how the games should be played as conceived or imagined by mathematicians or scholars. Humans play games and make decisions. Therefore, human psychology and behavior patterns play vital roles in the games they play. We first introduce the concepts of habitual domains and behavior mechanism as the basic tool for describing games as people play and how people form winning or win-win strategy by restructuring games. An anatomy of games which contains a number of parameters are introduced to facilitate the restructuring of games as to have a win-win game situation on one hand, and to form winning strategies on the other. Basic principles and practical procedures for forming winning strategies are also provided.



**Abstract**

In this paper we discuss the problem of existence of the core and subcore of TU-cooperative game from the linear programming point of view and consider some geometrical properties and mutual positions of the core, subcore, grand subcore, nucleolus and proportional nucleolus. Under additional restrictions for the structure of optimal solutions' set of considered linear programming problem sufficient conditions have been obtained for the nucleolus to be a selector of the grand subcore. Moreover we proved the proportional nucleolus, which is the modification of a nucleolus, is a selector of the grand subcore in any balanced $n$-person TU-cooperative game.